Who Was Petri?

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For presenting the subject of bacteria to high school classes in hygiene and biology, the most indispensable piece of apparatus is the Petri dish. But,—who was Petri? And when and why did he invent the dish which goes by his name?

Probably many a teacher, in introducing his pupils to the experimental study of germs, has made some casual reference to the inventor of the ubiquitous double glass dish, and may have assumed, as I have, that the form of the name indicated an Italian origin. About a year ago I had occasion to inquire more particularly just when and why this supposed Italian invented his useful appliance.

First, I turned to the Encyclopaedia Brittanica, in full confidence that I should find there the neccessary details, but there was not a word. In surprise, I scanned the pages of other encyclopaedias at the Public Library at 42nd St., looking through editions brought out in America, England, Germany, Italy, France, and Norway, but without finding mention of any special dish. Petris there were common enough. A certain Olaus Petri, a Swedish theologist, received most space, but there were Germans of the same name, Dutch, Italian, Swiss, and in the English forms, Petries and Petrys. Finally, about tenth in the sequence of different encyclopaedias, I found in the Spanish "Encyclopaedia Universal Illustrada" a brief reference to R. J. Petri as a German bacteriologist, but with no reference to any particular apparatus perfected by him. For an exact reference to the original description of the "Petri" dish I am indebted to Dr. George M. Reed of the Brooklyn Botanic Garden. This first description of the apparatus is brief, and, considering its wide use, is well worth reprinting in translated form in full.

"A slight modification of Koch's plating method."[1]

"In order to make gelatin plates according to Koch's method, it is necessary as is well known, to use the horizontal, once-

[1] Petri, R. J. "Eine kleine Modification des Koch'schen Methoden Plattenverfahrens." Centralblatt for Bacteriologie (Abt. 1. Band) 1: 279, 280. 1887.

enclosed pouring apparatus. The finished plates are then placed in layers, one on top the other, on glass 'benches' under large bell jars. It is remarkable what can be accomplished in many cases with only limited facilities, especially without the pouring apparatus. Since the beginning of the school year, I have been using flat, double shells of about 10-11 cm. in diameter, 1-1.5 cm. high. The upper shell served as a cover and had a somewhat larger diameter. Into these dry-sterilized and and cooled shells I poured the liquid nutrient gelatin with its inoculated material. As the over lying shell is only slightly raised, and the gelatin is protected by the cover, it is not likely that there will be contamination: for example, the germs in the air could hardly enter. The spout is flamed in the usual way and cooled. The gelatin hardens very quickly when poured and forms a layer one millimeter in thickness, which is preserved for a considerable time, as it is protected by the upper cover shell.

"In experimenting with soil material, sand, dirt, and similar substances, it is an advantage to pour the material into the shell with liquid gelatin. One gradually acquires considerable skill in doing this. By using short, jerky motions of the shell, an even distribution of the material is obtained. If the foregoing instructions are followed every particle of the poured-out gelatin may be examined with an ordinary microscope. Only by excessive action will the layer along the rim become uneven. The gelatin dries very slowly in these shells. It may be kept moist longer by putting several shells (5-6) on top of each other in a larger shell on a layer of moist filter paper, covered with a bell jar—mouse jar, battery jar. Such flat shells are especially suitable for agar-agar plates, inasmuch as agar is hard to fasten on simple plates without special means. Moreover, the counting of grown colonies is simplified. After removing the upper cover, a glass plate, on which the usual division into square centimeters and their divisions, is placed underneath. The counting lens is set up, and the count is made on a black background. The surface area of the shell is then calculated from its diameter."

It does not appear from Dr. Petri's own account whether the double glass "shell" which is recommended was a new device or shape specially prepared according to his specifications.

Possibly he merely made use of a type already in existence, but this does not detract in any way from the value of the contribution which he so modestly entitles "Eine Kleine Modification." Actually it appears to have been one of those fortunate inventions or adaptations, which despite lack of any fundamental novelty, nonetheless have very greatly advanced the convenience of mankind.

By comparison with the earlier apparatus, it simplified bacteriological technique materially, obviating the need of using any longer the cumbersome apparatus with which Koch had made his transcendent discoveries. Fully to appreciate the advantages of Petri's "kleine Modification," it will be worth while to reproduce a brief description of the supplanted method, quoted from Muir & Ritchie, Manual of Bacteriology, pages 60 and 61, 1913.

GLASS PLATES (Koch).[1]

When plates of glass are to be used, an apparatus on which they may be kept level while the medium is solidifying is, as has been said, necessary. An apparatus devised by Koch is used (Figs. 17, 18). This consists of a circular plate of glass (with the upper surface ground, the lower polished), on which the plate used for pouring out the medium is placed. The latter is protected from the air during solidification by a bell-jar. The circular plate and bell-jar rest on the flat rim of a circular glass trough, which is filled quite full with a mixture of ice and water, to facilitate the lowering of the temperature of whatever is placed beneath the bell-jar. The glass trough rests on corks on the bottom of a large circular trough, which catches any water that may be spilled. This trough in turn rests on a wooden triangle with a foot at each corner, the height of which can be adjusted, and which thus constitutes the levelling apparatus. A spirit-level is placed where the plate is to go, and the level of the ground glass plate thus assured. There is also prepared a "damp chamber," in which the plates are to be stored after being made. This consists of a circular glass trough with a similar cover. It is sterilised by being washed outside and inside with perchloride of mercury 1–1000, and a circle of filter-paper moistened with the same is laid on its bottom. Glass benches on which the plates may be laid are similarly purified.

To separate organisms by this method, three tubes, a, b, c, are inoculated as in using Petri's capsules (p. 58). The hands having been washed in perchloride of mercury 1-1000 and dried, the plate box is opened, and a plate lifted by its opposite edges and transferred to the levelled ground glass (as in Figs. 17, 18). The bell-jar of the leveller being now lifted a little, the gelatin in tube *a* is poured out on the surface of the sterile plate, and while

[1] Muir & Ritchie—Man, of Bacteriology. Macmillan 1913, page 60, 61.

still fluid, is spread by stroking with the rim of the tube. After the medium solidifies, the plate is transferred to the moist chamber as rapidly as possible, so as to avoid atmospheric contamination. In doing this, it is advisable to have an assistant to raise the glass covers. Tubes *b* and *c* are similarly treated, and the resulting plates stacked in series on the top of *a*. The chamber is labelled and set aside for a few days till the colonies appear on the gelatin plates. The further procedure is of the same nature as with Petri's capsules.

In this very reference may be found a basis for evaluating definitely Petri's contribution. Just as the self-starter has multiplied the use of the automobile many times, so the Petri dish has very greatly increased the *convenience* of the experimental study of bacteria. From the standpoint of fundamental technical importance, Koch's earlier introduction of solid media was of much greater importance than Petri's innovation. To the latter, however, credit may be given for simplifying the technique, for eliminating time-consuming operations, for reducing the chances of infection, and for saving a vast amount of space. After a consideration of the involved processes used by Koch, it is scarcely to be questioned that, for the experimental demonstration of simple bacteriology in high school classes, the Petri dish is an indispensable tool.

Petri's life-span extended from 1852 to 1922. His work was mainly done while serving as a physician in a Berlin hospital. Reference to a complete bibliography shows that the paper describing the "Petri dish" was only one of a number dealing with the general field of bacteriology.

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